

Appl No. 09/942,586  
Response Dated 07/02/2003  
Reply to Office Action of 01/02/2003

Remarks / Arguments

This response is filed within the extension period for responding to the Office Action. A Request for an Extension of time is attached hereto.

In the Office Action, the Examiner made reference to 1 document:

Document	Date	Inventor
US-6,188,066	August 1999	Whitehouse et al.

Amendments to the Specification

The Applicant has made minor corrections in paragraphs 2 and 53 of the specification. These corrections are clerical in nature and the Applicant respectfully submits that they do not add new matter to the present application nor do they necessitate any additional searching by the Examiner.

Amendments to the Claims

Claim 1 has been amended to more precisely claim the present invention. Claim 1 as amended relates to a method of analyzing ions. The method comprises providing a stream of ions that includes a first group of ions having a first charge state and a second group of ions having a second charge state. The method also comprises providing an energy barrier in an ion processing section, the energy barrier having a magnitude that preferentially allows the first group of ions to escape from the ion processing section. The device of the present invention is thus capable of discriminating between groups of ions in the ion processing section based on the charge states of the different groups.

Claims 2, 4, 9 and 16 have been amended to bring their language into alignment with that of amended claim 1.

Claim 3 has been amended to make a minor grammatical correction. This amendment is not made for any purpose related to patentability and any skilled person would have understood the claim as filed without this amendment.

Claim 5 has been amended to make it dependent on claim 1, and to indicate more particularly that terminating the supply of ions occurs between steps (1) and (2) set out in claim 1.

Claim Rejections – 35 USC § 102

The Examiner rejected claim 1 as originally filed on the basis that it was obvious in light of Whitehouse. Whitehouse relates to a multipole ion guide that extends through multiple pumping stages in an atmospheric pressure ion source mass spectrometer. See the Abstract. Whitehouse's device ions with a range of mass to charge (m/z) ratios to be transmitted through a multipole ion guide, by configuring the stability region of the ion guide. Ions that have a m/z outside of the stability region are able to travel off-axis and are rejected from the ion guide. See col. 3, lines 48-63.

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The stability region of the multipole ion guide is determined by setting the AC and DC characteristics of a voltage applied to the quadrupole ion guide. See column 4, lines 5-21.

Whitehouse does not discuss discrimination between groups of ions based on their charge states, but only on the basis of their mass to charge ratios.

With respect to Claim 1, the Examiner made particular reference to col. 3, lines 51-61 and col. 4, lines 10-14. In these and the surrounding sections, Whitehouse describes the basic structure and operation of his device. As noted above, the device is capable only of discriminating between ions based on their m/z ratio. Whitehouse does not describe or even suggest selecting between ion (or groups of ions) based on their charge states. In fact, the multipole ion guide described by Whitehouse is not capable of such selection since the control voltage applied to multipole ion guide will operate identically on ions with the same m/z ratio. Since ions with the same m/z ratio may have different charge states, Whitehouse's device cannot be used to carry out the process of claim 1.

The Applicant respectfully submits that Claim 1 is not anticipated by Whitehouse.

The Examiner also rejected claims 2-5 and 7-10 based on the same sections of Whitehouse. Since each of these claims is dependent on claim 1, the Applicant respectfully submits they are not anticipated by Whitehouse for the same reasons.

The Examiner rejected claims 6, 11-14 and 22 on the basis of Whitehouse at column 4, lines 16-21. Each of these claims is dependent on claim 1, and accordingly includes the limitations that an energy barrier capable of allowing a first group of ions to preferentially escape the ion processing section, where the first group of ions has a different charge state than a second group of ions.

In the noted section, Whitehouse states that his device is capable of delivering an ion beam with low energy spread. However, the ion beam includes ions with different charge states, and cannot be configured to eliminate ions from the ion beam based on their charge state. Accordingly, Whitehouse does not provide the function of the present invention.

The Examiner also made reference to Whitehouse at column 7, lines 57-63 and column 8, lines 18-33. In these sections, Whitehouse describes a system of electrostatic fields and skimmers. These elements serve to electrostatically focus and accelerate ions into subsequent vacuum pumping stages and into the quadrupole mass filter 18. These elements do not operate to selectively discriminate between ions based on their charge states. The electrostatic lens configuration can be used to select ions based on their m/z ratios, but not based solely on their charge states. See column 8, lines 60-65.

The Applicant respectfully submits that Claims 6, 11-15 and 22 are not anticipated by Whitehouse for these reasons and for the same reasons set out above in respect of Claim 1.

The Examiner rejected claims 15-21 and 23 and made reference to column 8, lines 37-44 of Whitehouse. In this section, Whitehouse explains that Collisional Induced

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Dissociation can be used to affect the energy and energy spread of ions before they are mass analyzed. This mechanism is well known and the use of a neutral gas to assist in thermalizing ions is described in the present application at paragraph 39. Thermalizing ions improves the operation of the present invention and allows ions having different charge states to be more effectively separated. See also para 42 of the present application. Whitehouse mentions the well known process of thermalizing ions by introducing a neutral gas, however, he does not mention or even suggest subsequently discriminating between the ions based on their charge states.

Claim 15 makes reference to thermalizing ions in the ion processing section of the present invention. Claims 19-21 and 23 include a collisional process. Each of these claims includes all of the limitations of claim 1. These claims are patentable over Whitehouse for the reasons set out above in relation to claim 1 and because the use of the thermalizing process, as described in claim 15 (and its base claim and the intervening claims) is not suggested in Whitehouse.

The Examiner also made reference to column 10, line 33-42; column 17, line 24-26; and column 17, lines 46-62, which describes various aspects of multipole ion guides. The present invention is not constrained to an ion guide of any particular structure, but relates to the selecting of ions for mass analysis, possibly using a multipole ion guide. Accordingly, the cited sections are not relevant to patentability of claim 15-21 and 23, which are all patentable over Whitehouse for the reasons set out above in relation to claim 1.

### Conclusion

In view of the foregoing comments, it is respectfully submitted that the application is now in condition for allowance. If the Examiner has any further concerns regarding the language of the claims or the applicability of the prior art, the Examiner is respectfully requested to contact the undersigned at 416-957-1624.

Respectfully submitted,

  
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